

*AMENDMENTS TO THE CLAIMS*

This listing of claims replaces all prior versions, and listings, of claims in the application.

1. (Canceled)

2. (Currently Amended) A control-program-development supporting apparatus that develops a control program described with a sequential-control language, said control-program-development supporting apparatus comprising:

a compiler which compiles the control program into codes directly executable by a microprocessor that includes at least one cache; and

an optimization filtering unit which reconstructs the control program into an optimum code system by excluding not-cited variables and redundant codes, recombining logical operations, and rearranging codes for locally arranging instructions for a common input or output device before the control program is compiled by the compiler, wherein a control program optimized by said optimization filtering unit is newly used as the control program.

3 and 4. (Canceled)

5. (Currently Amended) A control-program-development supporting apparatus that develops a control program described with a sequential-control language, said control-program-development supporting apparatus comprising:

a control-program dividing unit which divides the control program into ~~a plurality of controllable~~ blocks, each block including at least one rung; and

a compiler which compiles at least some of the ~~controllable~~ blocks into execution codes directly executable by a programmable controller, wherein the programmable controller includes a microprocessor having ~~at least one cache~~ pipeline logic.

6. (Canceled)

7. (Currently Amended) The control-program-development supporting apparatus according to claim 5, wherein the control program is a ladder diagram or an instruction list generated from the ladder diagram, and the control-program dividing unit divides the

control program into ~~a plurality of controllable~~ blocks, each block including at least one rung at a predetermined rung in the ladder diagram to generate a program file for every controllable block concerned.

8. (Currently Amended) The control-program-development supporting apparatus according to claim 5, wherein the control program is a ladder diagram or an instruction list generated from the ladder diagram, and the control-program dividing unit divides the control program into ~~a plurality of controllable~~ blocks, each block including at least one rung at a predetermined rung serving as a jump destination for a jump instruction in the ladder diagram to generate a program file for every controllable block.

9. (Currently Amended) The control-program-development supporting apparatus according to claim 5, wherein

the control program is a ladder diagram or an instruction list generated from the ladder diagram, and

the control-program dividing unit extracts at least some rungs including instructions to a common input or output device from the ladder diagram, at least some of the rungs extracted constituting one controllable block, and generates a program file for every ~~controllable~~ block.

10. (Currently Amended) The control-program-development supporting apparatus according to claim 5 further comprising an optimization filtering unit which reconstructs the control program into an optimum code system by excluding not-cited variables and redundant codes, recombining logical operations, and rearranging codes for locally arranging instructions for a common input or output device before the control program is compiled by the compiler, wherein

a control program optimized by said optimization filtering unit is newly used as the control program, and

the microprocessor includes pipeline logic and a cache.

11. (Previously Presented) The control-program-development supporting apparatus according to claim 5, further comprising a processing-time rough-estimating unit which has a relating table which relates sample program having known processing times with the control program corresponding to the execution codes to estimate a sequential-processing execution time of a programmable controller in accordance with the

relating table, wherein the processing-time rough-estimating unit determines and selects the sample program most similar to the control program to estimate processing time.

12. (Currently Amended) A control-program-development supporting apparatus that develops a control program described with a sequential-control language, said control-program-development supporting apparatus comprising:

a control-program dividing unit which divides the control program into ~~a plurality of controllable blocks~~, each block including at least one rung;

a control-program converting unit which converts at least some of the ~~controllable~~ blocks into high-level-language control programs described with a computer-readable high-level language for every ~~controllable~~ block; and

a compiler which compiles at least some of computer-readable high-level programming languages corresponding to every ~~controllable~~ block into codes directly executable by a programmable controller.

13. (Canceled)

14. (Currently Amended) The control-program-development supporting apparatus according to claim 12, wherein

the control program is a ladder diagram or an instruction list generated from the ladder diagram, and

the control-program dividing unit divides the control program into ~~a plurality of controllable blocks~~, each block including at least one rung at a predetermined rung in the ladder diagram to generate a program file for every ~~controllable~~ block.

15. (Currently Amended) The control-program-development supporting apparatus according to claim 12, wherein the control program is a ladder diagram or an instruction list generated from the ladder diagram, and the control-program dividing unit divides the control program into ~~a plurality of controllable blocks~~, each block including at least one rung at a predetermined rung, serving as a jump destination for a jump instruction in the ladder diagram, to generate a program file for every ~~controllable~~ block.

16. (Currently Amended) The control-program-development supporting apparatus according to claim 12, wherein

the control program is a ladder diagram or an instruction list generated from the ladder diagram, and

the control-program dividing unit extracts at least some of rungs including instructions to a common input or output device from the ladder diagram, constituting one controllable block of at least some of the extracted rungs, and generates a program file for every ~~controllable~~ block.

17. (Currently Amended) The control-program-development supporting apparatus according to claim 12 further comprising an optimization filtering unit which reconstructs the control program into an optimum code system by excluding not-cited variables and redundant codes, recombining logical operations, and rearranging codes for locally arranging instructions for a common input or output device before the control program is compiled by the compiler, wherein a control program optimized by said optimization filtering unit is newly used as the control program.

18. (Previously Presented) The control-program-development supporting apparatus according to claim 12, further comprising a processing-time rough-estimating unit which has a relating table which relates sample programs having processing times already known with the control program corresponding to the execution codes to estimate a sequential-processing execution time of a programmable controller in accordance with the relating table, wherein the processing-time rough-estimating unit determines and selects the sample program most similar to the control program to estimate processing time.

19-25. (Canceled)

26. (Currently Amended) A programmable controller that performs sequential processing in accordance with execution codes generated by compiling a control program, said programmable controller comprising:

a storing unit which stores the execution codes;

a microprocessor including ~~at least one cache~~ pipeline logic and directly executing the execution codes; and

a control-program-development supporting apparatus that develops a control program described with a sequential-control language, the control-program-development supporting apparatus having

a control-program dividing unit which divides the control program into ~~a plurality of controllable~~ blocks, each block including at least one rung; and

a compiler which compiles at least some of the ~~controllable~~ blocks into execution codes directly executable by a programmable controller.

27. (Currently Amended) A programmable controller that performs sequential processing in accordance with execution codes generated by compiling a control program, said programmable controller comprising:

a storing unit which stores the execution codes;

a microprocessor including ~~at least one cache~~ pipeline logic and directly executing the execution codes; and

a control-program-development supporting apparatus that develops a control program, described with a sequential-control language, the control-program-development supporting apparatus having

a control-program dividing unit which divides the control-program into ~~a plurality of controllable blocks, each block including at least one rung;~~

a control-program converting unit which converts at least some of the ~~controllable~~ blocks into high-level-language control programs described with a computer-readable high-level language for every ~~controllable~~ block; and

a compiler which compiles at least some of computer-readable high-level programming languages corresponding to every ~~controllable~~ block into codes directly executable by a programmable controller.

28-37. (Canceled)